

WAX-FLASKS.



No. 1. Small flask with stopper. No. 2. Medium flask with stopper. No. 3. Large flask with stopper. No. 4. Small flask with stopper. No. 5. Medium flask with stopper. No. 6. Large flask with stopper.

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THE DIAGNOSIS AND TREATMENT OF HÆMOPHTYSIS IN CASES OF PULMONARY TUBERCULOSIS.

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HÆMOPHTYSIS means literally the spitting of blood. This may be due to many causes, and before treatment of the hæmoptysis is undertaken as originating from pulmonary tuberculosis, we must, by a process of elimination, exclude all other causes, and so make a certain diagnosis that the hæmoptysis is due to the presence of tuberculous disease in the lungs. This is frequently a difficult task.

In reviewing the various sources of hæmorrhage giving rise to blood-spitting, we may divide hæmoptysis into the following groups: I. Hæmorrhage from areas other than the lungs: this may be termed "spurious" hæmoptysis. II. Hæmorrhage from the lungs, or "real" hæmoptysis.

Causes of "Spurious" Hæmoptysis.

The sources of "spurious" hæmoptysis may be thus classified: 1. From the upper respiratory tract: (a) Epistaxis, (b) bleeding from pharynx, (c) bleeding from larynx, (d) bleeding from trachea. 2. From the alimentary tract: (a) Bleeding from the gums, (b) bleeding from the œsophagus, (c) bleeding from the stomach. 3. In connection with the circulatory system—*e.g.*, rupture of aneurism into the trachea. 4. In general diseases—*e.g.*, blood diseases and acute infectious fevers; also hysteria.

Hæmoptysis from the Lungs, or "Real" Hæmoptysis.

The primary cause for real hæmoptysis may not necessarily be in the lungs. The primary cause may be in (1) the lungs, or arising in

connection with secondary conditions due to (2) disorders of the circulatory system. By far the commonest cause of hæmorrhage is pulmonary tuberculosis, but hæmoptysis may occur as a sign of tumour of the lung or respiratory passages. It has been known to occur in connection with hydatid cysts.

1. Pulmonary hæmorrhage may be met with in inflammatory diseases, pneumonia, pertussis, bronchitis, acute infective fevers; also in chronic pulmonary inflammations, syphilis of the lung, streptotrichosis (tuberculosis). Hæmoptysis may be a result of traumatism. It occurs in certain blood diseases. A form of endemic hæmoptysis is met with in China and Japan due to the fluke *Distoma Westermanii*.

2. Pulmonary hæmorrhage arises in connection with lesions of the circulatory system, particularly in mitral stenosis and pulmonary embolism and infarction.

Clinical Procedure in Differential Diagnosis of Hæmoptysis.

If the hæmorrhage does not obviously come from the lungs, it may be necessary to examine carefully all other sites from whence hæmorrhage may occur, especially if the actual hæmoptysis has ceased by the time the patient is seen. If the patient has previously suffered from real hæmoptysis, due, for example, to pulmonary tuberculosis, he is very liable, in his anxiety, to mislead the doctor as to the exact state of affairs, especially if he happens to have coughed at the same time as or before the hæmoptysis. In such a case it may appear at first sight even to the physician that it is a case of real hæmoptysis; but having first rapidly examined the lungs and found no obvious cause of real hæmoptysis, he must investigate whether the origin of the bleeding is from some area other than the lungs. It may be necessary to proceed to examine these areas to some extent seriatim if the cause of the hæmorrhage is obscure. If the nose is full of blood-clots, having washed the clots away from the orifices of the nose, examining the nose with a speculum and good light, he may find a bleeding spot on the nasal septum, and be able to reassure the anxious patient that the bleeding is not from the lungs. Epistaxis in young people may be from adenoids or a fibro-sarcoma in the naso-pharynx, and these may be found as the cause of the bleeding. The association of adenoids with defective chests is a source of error in diagnosis as to the cause of hæmoptysis. If the nose has been eliminated as the cause, the pharynx must now be examined. There a dilated vein on the posterior pharyngeal wall may be found bleeding or clotted. A hypertrophic pharyngitis is at the same time often associated with a dry, hacking cough suggestive of early pulmonary tuberculosis. If no cause has yet been found for the hæmorrhage, the laryngoscope may reveal it. One may find a bleeding dilated venule on the laryngeal mucosa or obvious

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laryngeal ulceration. The site may be still lower, and the bronchoscope may portray a bleeding ulcer in the trachea, due to tuberculosis, syphilis, or carcinoma.

Having found no cause in the upper respiratory tract, the alimentary causes of bleeding should be thought of. A fairly common cause of blood in the mouth in quite healthy people is bleeding from the edges of the gums. Blood-stained discharge is often met with in pyorrhœa alveolaris. Even when the gums and teeth are quite healthy, the gums may bleed freely when the teeth are brushed, and the site of the blood-spitting may be found if the patient is told to watch his gums carefully. The blood will be seen oozing out between or round the teeth at the edge of the gum. This occurs especially in mouth-breathers, who often find blood in the saliva when they first spit in the morning. This is often a source of anxiety in patients with early pulmonary tuberculosis, who sometimes, in real hæmoptysis, only realize that it is such by the presence of blood suddenly appearing in the mouth without any apparent cough to cause it. In gouty or cirrhotic subjects hæmoptysis may come from bleeding œsophageal varices. This will be diagnosed by the œsophagoscope and the presence of gout or cirrhosis, with their typical objective phenomena. In some cases hæmatemesis may resemble hæmoptysis, especially as it often happens that a patient vomits from the strain of a cough which has caused real hæmoptysis. The blood from the stomach is acid in reaction, while the blood from the lungs is alkaline. Often, also, the blood from a bleeding gastric ulcer is partially digested, brownish in colour, and lacks the bright red, frothy appearance of blood from the lungs; also, there will be the history of serious gastric disorder.

The other sources of spurious hæmoptysis give, as a rule, obvious signs by which they can be diagnosed or eliminated. The bleeding from a ruptured thoracic aneurism is, as a rule, copious and fatal, and the diagnosis may only be revealed by the post-mortem examination; but in some cases there is before the final rupture a gradual oozing of blood into the trachea, which is finally got rid of by blood-spitting. This cause must be eliminated before using the bronchoscope or œsophagoscope. General diseases such as scurvy, leukæmia, and acute fevers, give their own various and typical symptoms and signs.

The only other source of spurious hæmoptysis where the diagnosis is sometimes difficult is hysteria, especially if the patient is at the same time a phthisical subject. The sputum is sometimes in such cases of a red-currant jelly appearance. I recently had such a case under my care. The patient was a female subject who some years ago was treated for pulmonary tuberculosis at a well-known sanatorium, where she had suffered from hæmoptysis of the lungs. She now has some signs of this disease at the right apex, and recently had signs of dry

pleurisy at the left base. She took to bed recently with complaint of hæmoptysis. On the assumption that the hæmorrhage was again from the lungs, I kept her in bed for ten days. Each morning she showed me her sputum-pot, and in it there was always about 3 ounces of watery material stained with a pink tinge, resembling red-currant jelly. I examined her chest carefully every day, but could find no signs in it which suggested recurrent hæmorrhage going on there. She took her own temperature, and proclaimed it at night as usually being 100° to 102° , but her pulse remained about 56 to 66. One night her temperature was 102° , so the nurse was asked to take the temperature immediately after her own record of it. The nurse found the temperature to be 99° . During the whole period the patient proclaimed that she was very anxious to be at her work instead of in bed. She had never coughed up any blood-stained sputum. From a reconsideration of the whole symptoms, therefore, I ordered her up and back to work. Since that day she has had no hæmoptysis, and is quite well and at work all the time. The patient was of a neurotic temperament.

True Hæmoptysis as a Sign of Pulmonary Tuberculosis.

Having by thorough examination excluded all forms of spurious hæmoptysis, it is necessary to re-examine the lungs. We have already assumed, *e.g.*, that the case under consideration shows no obvious sign of pulmonary tuberculosis on rapid examination of the chest. This is often the case. Hæmoptysis is frequently the first sign of a very early case of pulmonary tuberculosis, and acts as a signal of alarm to the patient. The patient usually has felt in normal health, and has been working regularly up to the date of the hæmorrhage. He has had no other symptoms at all, or the other symptoms have been so slight that the patient himself has not realized them as symptoms. On questioning such a patient, one may find that he has had a very slight dry cough for some time. He may have felt a little tired after his work, but so little that he regarded it as normal fatigue. He may have had a little sputum in the morning on getting up, but he is convinced it comes from the back of his nose. In tuberculosis dispensary practice, when such a patient arrives, one knows that the physical examination must be long and tedious, because, as a rule, the physical signs are all but negative. But the presence of the actual fact of hæmoptysis also alarms the physician. As there is no cause of spurious hæmoptysis, one has to re-examine the lungs very carefully. Then one may find a slight prolongation of expiration at one apex or a very insignificant dulness to percussion. The only sign may be an evanescent ronchus or crepitation at the apex after coughing. The suspicious sign is practically always at the apex in adults, correspond-

ing to the usual sites of deposit of early pulmonary tuberculosis in the adult person—*i.e.*, at the areas of alarm, the inner end of first spaces in front, and the apices of the upper and lower lobes behind. More often it is at the right apex than the left, corresponding to the findings of Birch-Hirschfeld that the first deposit of tubercle is usually in the posterior branch of the apical bronchus on the right side. The physical signs are so uncertain that, but for the occurrence of the hæmoptysis and the resulting second examination of the lungs, the physician would very likely overlook them. In the rush of a recruiting office, the recruiting medical officer would very probably pass the candidate for general service. If the candidate never mentioned the hæmoptysis, he would most certainly pass. Such are some of the cases which have broken down with definite pulmonary tuberculosis out in France under the strain of the campaign, and are now inmates of our sanatoria too late. The only other condition which may be confused with such a case is hæmoptysis due to mitral stenosis. This must be excluded by inquiry into the history and careful examination of the heart.

The other causes of real hæmoptysis produce such definite signs that they would be discovered on the first examination of the chest. Tumour will be diagnosed by the history of a primary growth if the lung growth is secondary. The physical signs will be those of consolidation of the lung, with dullness to percussion, often suggestive of pleuritic effusion, diminished breath-sounds, and diminished vocal resonance. Sometimes bronchial breathing and increased vocal resonance are present. Hydatid cyst will be diagnosed with certainty if the cyst ruptures and the patient suddenly expectorates a quantity of clear fluid which contains hooklets and has an unpleasant taste. Sometimes the capsule of the cyst is coughed up with great difficulty. Hæmoptysis is often brisk in such a case. Before rupture X rays may reveal the shadow of the cyst; also, the complement-fixation test may be of value. A thrill is occasionally felt in an intercostal space. Inflammatory diseases such as pneumonia have their characteristic clinical picture. The hæmoptysis of pneumonia is slight, the sputum being sticky and rusty.

Chronic Inflammations.—Syphilis will be diagnosed by a history of infection, Wassermann test, and physical signs of fibroid lung, or if gumma is present a cavity may form. Actinomycosis will only be detected by the discovery of the ray fungus in the sputum. Hæmorrhage from traumatism and blood diseases need no special mention. Pulmonary embolism is diagnosed by presence of disease liable to cause such—*e.g.*, fractured femur, thrombosis of veins of the leg, valvular disease of the heart. The symptoms depend on size of embolus and

infarcted area. The physical signs of a small infarct are dulness and bronchial breathing. If the embolus is large, the patient will die from shock and dyspnoea without hæmoptysis occurring.

The Treatment of Hæmoptysis.

The four dangers to life from severe hæmoptysis are—(1) From primary asphyxia; (2) due to syncope; (3) through shock; (4) by secondary asphyxia. These four calamities may be averted or treated. The treatment therefore resolves itself into—(1) Prevention or treatment of primary asphyxia; (2) prevention or treatment of syncope; (3) prevention or treatment of shock; (4) prevention or treatment of secondary asphyxia; (5) prevention of recurrence of hæmoptysis. In a severe case the blood comes up the respiratory passages in large volume: 1, 2, or 3 pints. As a rule it comes on quite suddenly, but may be preceded by stained sputum for some days. It is always a serious condition, and is, as a rule, due to the rupture of a miliary aneurism in a vessel-wall which is crossing a vomica. It may be fatal in a few seconds. The patient dies suddenly either from primary asphyxia or primary syncope. When one is called in to such a complication, therapeutic measures must be taken at once. The patient has the sensation of a tickling in the throat, a salt taste in the mouth, and then comes the gush of blood. The doctor must judge in an instant the correct treatment by looking at the patient. He will be found sitting up in bed gasping for breath, and is in danger of being drowned in his own blood. The lips are blue and the fingers cold and cyanosed. The patient is in the greatest mental terror, and the facial expression is one of fear and dread of impending death. The forehead is covered with a cold sweat, and the pulse is feeble, rapid, and flickering, scarcely perceptible to palpation at the wrist. Small venules on the face and on the surface of the thorax are distended and blue. The ears are of a deep blue colour, and the eyes are suffused and engorged with blood. The veins of the neck are also distended, and the right heart is dilated. There is intense air hunger.

The Treatment of Primary Asphyxia in Cases of Hæmoptysis.

If such a patient is left in bed in the sitting or semi-recumbent posture, he will probably die. This position allows the blood to accumulate in the bronchial tubes, and gravity causes the blood (especially the heavier parts which form into clots) to lie in the finest bronchioles and close them up, so that no air enters the lungs. This causes the intense air hunger and desire for oxygen. The pressure of the accumulated blood may arrest the further bleeding, but also prevents the action of the cilia of the lining mucosa, so that no attempt reflexly to cough up the rapidly accumulating blood is made. Although the bleeding may thus

stop, the patient dies of primary asphyxia. To prevent this the patient should be turned over at once and put in the Schaefer position, lying prone, and artificial respiration carried out by Schaefer's method. In some cases I have found it necessary to lift the patient by the lower limbs, so that the head is lowest, and, taking advantage of gravity, allow the blood to run freely out of the lungs through the bronchi and trachea. The hæmorrhage will thus continue freely, perhaps, but primary asphyxia is prevented, and blood does not accumulate in the lungs and remain adherent to the bronchioles and bronchial walls. This latter is important, as it has much to do with the future prospects of the case in preventing secondary asphyxia, as will be shown later. If the bleeding is thus allowed to continue, it may often ultimately stop from the diminished total volume of the blood in the circulation and the blood-pressure getting so low. Partial syncope may result, but one must maintain a delicate balance between allowing occurrence of asphyxia and syncope.

Prevention and Treatment of Syncope.

Oxygen inhalations are to be given with $\frac{3}{30}$ grain strychnine or $\frac{1}{160}$ grain digitalin hypodermically, so that the heart may continue to contract on the lessened volume of blood in its chambers. It is surprising under such combined treatment of the asphyxia and syncope how rapidly the cyanosis disappears and the colour becomes a healthy red again, as seen in the lips and ears.

The nurse in attendance can aid in the prevention of the primary asphyxia by keeping the air entrances clear. She has her duty to perform in clearing away clotted blood from the nose and mouth, so that as much air as possible is secured by the patient at each breath. This also prevents secondary asphyxia from septic broncho-pneumonia, which will be shown later. Too much stress has been laid in the routine teaching of the treatment of hæmoptysis on the semi-recumbent position and on the value of morphia. The patient is allowed gradually to approach the more upright position in bed as the hæmorrhage gets less. In slight cases the sitting posture in bed is best. Morphia in a case such as depicted is out of the question during a crisis. It would diminish the cough reflex, but the life of the patient depends on this reflex being present till all danger of asphyxia is absent. Too much morphia is the cause of death from both primary and secondary asphyxia. If the hæmoptysis is not so severe and the danger of asphyxia is absent, and the colour of the patient is good, $\frac{1}{4}$ grain morphia subcutaneously is the proper treatment, as it will prevent recurrence by needless irritable cough. The pulse must be strong and regular also. The two drugs morphia and strychnine are contradictory, so that the treatment of the one case is the opposite of the other. Which is to be used in a given

case of hæmoptysis must be decided on at once by the physician, depending on the colour of the patient, the pulse, degree of asphyxia, and amount of hæmorrhage.

Prevention and Treatment of Shock.

The shock is often very marked in a case of severe hæmoptysis, especially if the hæmoptysis is not momentary in duration. The patient loses so much blood that there is no supply in the peripheral capillaries, and the skin becomes rapidly cold and clammy. He should therefore be wrapped up in warm blankets as soon as possible, after one has arrested the bleeding. Rigors sometimes occur. Hot bottles are applied to the abdomen and feet to dilate the skin capillaries. This in itself will diminish the hæmoptysis by attracting the blood to areas away from the lungs. The blood-pressure is very low. At this stage adrenalin or pituitrin are useful, given subcutaneously; but one must not give too much or too often, as it may cause a fresh hæmoptysis. Rist¹ recommends in hæmoptysis the intravenous injection of extract of posterior lobe of hypophysis, $\frac{1}{2}$ c.c., into veins. The treatment of a severe hæmoptysis is therefore a matter which requires skill and experience.

In the prevention of asphyxia one must not go so far that syncope occurs as a result, and in the prevention of syncope one must not go so far that one reproduces hæmoptysis and asphyxia. In the prevention of shock we must take care not to go so far as to reproduce hæmoptysis and asphyxia. A delicate balance must be maintained between all three.

The After-Treatment of Hæmoptysis: the Prevention of Secondary Asphyxia.

This varies according to the case, and requires as much care as the immediate treatment. If the patient's colour is very poor and strychnine is found necessary, the colour may return after the immediate danger of primary asphyxia is past. Then, in some hours' time, when the colour of the patient is good, and he is coughing up the smaller clots still left as the aftermath of his initial hæmorrhage, it may be right to give morphia to suppress useless cough, likely to cause fresh hæmorrhage. One must be careful, however, not to give too much morphia, so that the cough reflex is completely abolished, or clots may be retained which should be expectorated. Such clots, if they become septic, may set up a broncho-pneumonia which is fatal. It is therefore often advisable to judiciously combine an occasional dose of morphia with a routine stimulant expectorant mixture. If the

¹ Rist, *Berlin. Klin. Woch.*, June 9, 1913.

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lungs and bronchioles are not efficiently freed of the remaining blood by moderate expectoration, the blood remains adherent to the mucous walls of the larger bronchi and bronchioles, and to the walls of the alveolar spaces. The result is that the blood becomes organized, the action of cilia is paralyzed, the cilia are adherent or useless, and even the laryngeal reflex is lessened. The bronchioles are insensitive to the reflex irritation of the presence of foreign matter. Such a patient is in a condition analogous to a patient under an anæsthetic who aspirates blood from a septic mouth operation, and makes no attempt at expectoration. Septic particles are inhaled and septic broncho-pneumonia sets in. Broncho-pneumonia may set in apart from the presence of sepsis. In such a case the patient may remain well after the initial hæmorrhage for two or three days, when suddenly signs of secondary asphyxia appear. The patient becomes dyspnœic, cyanosed, and suffers from increasing asphyxia. A special symptom is a feeling of intense pain in the chest. If the chest is examined, sibilant rhonchi are heard all over, and the physical signs are those of capillary bronchitis. The blood in the alveoli and finer bronchioles has become organized and fibrinous, so that you have a serious combination of capillary bronchitis with a condition of the lungs resembling the grey hepatization of a lobar pneumonia. The finer bronchioles have their inner walls adherent with the fibrin, and areas of the lungs become collapsed. In the lungs the physical signs are therefore patches of dulness with tubular breathing and crepitations. There are also areas dull to percussion where the breath-sounds are absent, due to the total collapse and no air entering the alveolar spaces. The patient has intense air hunger, and dies from secondary asphyxia. In some cases death may occur from secondary syncope, owing to the strain on the heart due to the lung condition. Such a condition arises from a very severe hæmoptysis, despite proper treatment and without septic infection of the lungs, but it is more likely to occur secondary to a severe primary asphyxia, where the blood has been allowed to accumulate in the lungs by wrong position of the patient and wrong treatment at or after the initial hæmorrhage—*e.g.*, too much morphia. H. Senator¹ does not think there is much danger if the cough is suppressed of any irritant effect from the blood left in the lungs. He thinks it is all absorbed, and that the cough should be completely arrested.

Prevention of Sepsis.

This is of great importance. Secondary septic broncho-pneumonia is to be prevented. Here, again, the nurse's efforts to keep the mouth and nose clear of clots is of the greatest value. Nasal respiration must

Senator, "Die Therapie der Gegenwart," November, 1908.

be kept free during and after a hæmoptysis. If this is not done, the vibrissæ of the nasal orifice become clotted and adherent. These vibrissæ are the respiratory first line of defence against sepsis just as the bronchial cilia and laryngeal reflex are the secondary line of defence. If both are allowed to become adherent with clots, both lines of defence are paralyzed in their defensive action. If the vibrissæ and nose are clotted, the vibrissæ are useless as a filter to inhaled septic bacteria. The patient then inhales septic bacteria through the mouth, especially if clots in the mouth are not cleaned away and become septic. Ninety-five per cent. of inhaled organisms are arrested by these vibrissæ in health, and destroyed by the nasal secretion of the anterior nares, which by experiment has been shown to have much greater bactericidal power than the secretion of the posterior nares.

The cleansing of the mouth by the nurse during and after hæmoptysis is quite as important. If clots are left, the cocci swarming in the mouth invade them and decompose them. It requires very little blood to be left in the mouth—*e.g.*, adherent to the teeth—before the patient's breath becomes very offensive. This septic state of the mouth upsets the appetite and stomach so much that vomiting may occur. The strain of vomiting may then induce a fresh hæmoptysis. Frequent cleansing of the mouth after a severe hæmoptysis is therefore a prophylactic measure against recurrence. All patients with a tendency to hæmoptysis should constantly use an antiseptic mouth-wash, keep the teeth scrupulously clean, and have carious teeth attended to. If hæmoptysis does recur the chances of septic pneumonia are lessened. This care of prevention of sepsis in the mouth is again analogous to the care that all surgeons take when operating in the mouth region that the mouth is first pure, so that septic blood will not be inhaled during the anæsthetic when the reflexes are diminished. In all cases of recurrent hæmoptysis I order an antiseptic mouth-wash to be used frequently if the teeth are at all carious.

The necessity for keeping the nasal passages clear is still further increased, because so many phthisical patients suffer from some form of nasal obstruction, that perhaps nasal obstruction is a predisposing cause of pulmonary tuberculosis.

After-Treatment of Hæmoptysis and the Prevention of Recurrence.

For twenty-four hours after the hæmoptysis very little food must be given, and for the first few hours nothing but sips of water. Ice sucked has no effect on a bleeding vessel in the lung. An ice-bag applied externally is more likely to do harm than good. It may increase shock, and by constricting superficial vessels of the skin will dilate the deeper pulmonary vessels. The food at first should be

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mainly proteid in character—gelatin jellies, albumin water, raw-beef juice. Carbohydrates liable to ferment and cause flatulence are to be avoided at first. Owing to the large withdrawal of blood, the digestive powers are enfeebled after severe hæmorrhage, so that the proteid food given must be easily absorbed and cause little hard residue. Beef-tea, vimbos, and meat extractives which are stimulants, must be given sparingly. The patient must be kept on absolute rest till all trace of blood in the sputum is gone. He must be warned against straining at stool. The blood-pressure must be kept low by an occasional dose of calomel, followed by a saline in the morning. For the same purpose a powder consisting of Dover's powder with mercury and chalk is recommended by some authorities. This will also prevent the fæces getting hard and requiring strain to defæcate. Small doses of liquid paraffin given three times a day also assist in this direction. Solid food must not be withheld longer than a day or two, even though hæmorrhage recurs, or the patient will become rapidly weaker and die from an advance of the disease or weakened resistance to septic absorption. Any member of the staff suffering from a catarrhal cold should not be allowed to attend on the patient. The patient should be prohibited visitors, and should be kept free from mental excitement, in a room by himself. Tobacco-smoking is prohibited. Tea, coffee, or alcohol are omitted from the diet.

If the blood-pressure is high the vaso-dilators may be given—trinitrin tablets or sodium nitrite. These are of little use in persons of elderly age where the vessels are thickened and do not respond. The patient may have placed beside his bed amyl nitrite capsules. If he feels another hæmoptysis coming on, he may break one and inhale it at once. The vaso-dilatation of the systemic arteries thus produced may prevent the recurrence of the hæmorrhage. It is better that a nurse be in attendance night and day for the first few days, so that she can watch the movements of the patient, who is apt to take liberties too soon. She will also watch that the patient does not strain at stool, and keep the mouth and nose clean. She also will feed the patient at regular times with small amounts at each meal. Because of the possible danger of syncope with the inhalation of amyl nitrite, she preferably will give the patient this herself, if necessary. Calcium lactate, gr. xv. three times a day after food in milk, may be given. It is supposed to increase the coagulability of the blood. Terebene, ℥x., may be given instead twice a day in the form of capsules. It must be avoided if it upsets the patient's stomach or if the urine contains albumin. If the hæmorrhage is unilateral, the affected side should be strapped as soon as possible after the first crisis is over. The strapping should embrace the whole of one side and extend from the opposite side of the sternum to well beyond the spine on the opposite side. It

should be laid on in strips in an imbricated fashion. Dry cupping of the affected side is sometimes useful. To increase the coagulability of the blood gelatin injections have been advised; $\frac{3}{4}$ iv. to $\frac{3}{4}$ vi. of a sterile 3 per cent. solution is injected under the skin of the abdomen. Danger of sepsis is not negligible, and tetanus has occurred. I have never found it necessary to use it. Salt in large doses increases the blood coagulability. Müller has recently recommended intravenous injection of isotonic salt solution; 5 c.c. of 10 to 15 per cent. solution of NaCl sterilized and heated to body temperature is injected into the median basilic vein. It causes pain if some escapes into subcutaneous tissues in the process of injection.

The physician should not indulge in needless and useless frequent physical examinations of the chest. The patient should wear clothes that are easily opened up for this purpose. Too many patients wear very tight-fitting undervests that cause much needless energy to be expended in getting off for purposes of examination. Percussion is prohibited. Often it is necessary only to auscultate lightly the front of the chest, with the patient lying flat. When the physician is in charge of a large number of cases in a sanatorium he should have previously stored in his memory the possible site of hæmorrhage in each case under his care, so that he need often only examine one area to locate the site of the hæmorrhage when he is suddenly called to an individual case.

The Management of Moderate Hæmoptysis.

The immediate treatment which I give as a rule is $\frac{1}{4}$ grain morphia and $\frac{1}{2}$ grain emetine hydrochloride subcutaneously. Both may be repeated if the hæmorrhage does not stop completely. Flandin and Joltrain¹ found resistant hæmoptysis cease after injection of 0.04 centigramme of chlorhydrate d'émétine. Beresford-Robinson² in mild cases gives $\frac{2}{3}$ grain emetine hydrochloride daily till about five days after the least trace of colour has appeared in the sputum. The emetine is put up in sterile solution in sterile ampoules. Each ampoule contains $\frac{1}{2}$ grain in 1 c.c. It is of a yellow colour, and becomes more yellow on keeping. One must be careful not to repeat emetine too often, or toxic symptoms of emetine-poisoning may arise. It is not known definitely how emetine acts in hæmoptysis. Emetine increases the bronchial secretion of mucus. It is possible that the emetine is excreted by the lungs and bronchi, and that this increased secretion in the respiratory passages closes up the opening in the bleeding lung vessels. It is difficult to say whether a hæmoptysis has stopped of its

¹ Flandin and Joltrain, *Le Progrès Médical*, Nos. 17 and 30, 1913.

² Beresford-Robinson, *Practitioner*, October, 1915.

own accord or as the result of the treatment, so that, although I have used emetine very frequently, I cannot say how much of its apparently good effect is due to the emetine.

I have also found coagulose useful. This is the dried blood-serum of horses. It is in the form of a dry powder put up in sterile glass phials by Parke, Davis and Co. It is dissolved with difficulty in sterile water, which must not be above the temperature of 98° F. The sterile water is added to the sterile powder in the phial to form a dose of 8 c.c. The phial has to be shaken very vigorously to dissolve the powder. It then forms a very glutinous fluid, and the shaking produces a lot of bubbles of air in the fluid. These are with difficulty expelled from the sterile syringe before injecting under the skin of the arm. At the area of injection there is often a considerable area of tenderness, and redness which forms some hours after, resembling a serum rash, but anaphylaxis does not occur from repeated doses. Dewar¹ treated a case of hæmoptysis with several repeated intravenous injections of 20 c.c. normal serum with success. It caused some urticaria and muscle pain. Euclottin is also a preparation of blood, made from blood-platelets, but I found it of no value. Perhaps, however, I used it in too small a dose. To prevent recurrence the same treatment is used as advocated for this purpose under severe hæmoptysis.

There are other methods which have been used in the treatment of hæmoptysis. Professor Dixon² strongly advocates the use of calcium subcutaneously. I once used calcium chloride for this purpose, but it is too caustic, and caused severe pain at the site of injection. It did not arrest the recurrent hæmoptysis in this case. Calcium glycerophosphate in doses of 2 to 3 grains is the better salt.

The Production of Artificial Pneumothorax for the Treatment of Hæmoptysis.

By this procedure one obtains a more complete rest of the bleeding lung, but one must be still more careful to be sure of the site of the hæmorrhage. This is not always easy. Sometimes it is simple. A patient has a dry cavity on one side, and as a result of the hæmorrhage the patient has pain over the site of the vomica, and bubbling crepitations are heard over the vomica. In such a case the patient often indicates the site by his own sensations. In bilateral disease hæmorrhage may occur on both sides. In some such cases definite extensive disease may have been previously detected on one side. One is apt to conclude that this is the side of the hæmorrhage. Yet it may arise in a previously unsuspected focus on the apparently sound side. Aspiration of blood often causes moist sounds on the non-bleeding side.

¹ Dewar, *British Medical Journal*, June 9, 1913.

² Dixon, *Practitioner*, January, 1913.

Before using artificial pneumothorax in such a case, one must be quite sure of the site of the hæmorrhage or a fatal mistake may occur. Any form of artificial pneumothorax apparatus may be used. The pleural space must be free. It is usually necessary at the first filling to inject enough gas to produce a positive pleural pressure. As the patient may be already suffering from shock, symptoms of increased shock must be watched for. The pulse, respirations, and effect on the hæmorrhage must be carefully watched during the operation. Pottenger¹ considers that most cases where artificial pneumothorax has been found to arrest hæmorrhage would have recovered in any case without it. In a sudden emergency the following procedure has been adopted: A hypodermic needle sterilized with a glass tube attached, containing sterile cotton-wool as a filter, is thrust into the pleural space. Air is sucked into the pleura until the pleural pressure is no longer negative. Rothschild² considers that artificial pneumothorax may cause death from miliary tuberculosis, owing to the blood being forced out and aspirated into healthy areas of lung. On the same principle of collapse Lischkiewitsh³ has advocated in severe hæmoptysis thoraco-plastic pneumolysis after a delay of two weeks.

Specific Treatment and Hæmoptysis.

This includes tuberculin, Spengler's I.K., and vaccines. If a patient is having this form of treatment and hæmoptysis occurs, it is better to withhold the injections for the time being, owing to the danger of hyperæmia as the result of focal reaction. Pettit⁴ advises the prophylactic treatment of hæmoptysis by autogenous vaccines. Since he has used this therapy he claims he has decreased his cases of hæmoptysis by 50 per cent. There is no doubt that catarrhal or mixed infection may set alight an old focus and cause hæmoptysis. For that reason I allow no person with a cold to attend on a case of pulmonary tuberculosis with hæmoptysis. Krämer-Böblingen⁵ thinks that the focal reaction of tuberculin prevents hæmoptysis.

Treatment of Secondary Anæmia due to Hæmoptysis.

This is best treated with iron and arsenic. Raw-meat juice is very useful.

¹ Pottenger, "Clinical Tuberculosis," London: Kimpton, 1917.

² Rothschild, *Deutsch. Med. Woch.*, November 23, 1911.

³ Lischkiewitsh, *Deutsch. Med. Woch.*, 1913.

⁴ Pettit, *Journal of American Medical Association*, December 24, 1910.

⁵ Krämer-Böblingen, *Wien. Med. Woch.*, No. 39, 1908.

TUBERCULOSIS AND TOXÆMIA.

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It is scarcely an exaggeration to say that the standard views on the differential diagnosis of tuberculosis are still Mid-Victorian; and this is so in spite of a notable increase in the accuracy of modern diagnostic methods. The reason is clear: when "early" diagnosis was, as we now know, actually late diagnosis the only disease calling for differentiation were conditions of more or less massive involvement of the lungs by non-tuberculous disease. Nowadays, when diagnosis is insisted on in the so-called "pre-bacillary" stage, it is necessary to distinguish not only many small non-tuberculous local lesions, but also affections where constitutional disturbance is possibly the only outstanding feature. It is unnecessary to labour the question of the existence of latent or almost spontaneously healed lesions amongst a considerable proportion of the European race; and it is equally unnecessary to prove that in many cases of pulmonary tuberculosis with bacilli in the sputum there may be few or no physical signs in the chest, with, nevertheless, grave disturbance of the general metabolism, resulting from a tuberculous toxæmia. It must be clear, then, that if the symptoms of non-tuberculous toxæmia are in any way comparable with those of tuberculous toxæmia, a possibility of gross error in diagnosis exists. Yet, in spite of the fact that non-tuberculous toxæmias occur frequently in general practice, few observers mention the necessity of differentiating them from tuberculous conditions. The difficulty may be suggested in the form of a question: When any case is suspected of tuberculosis on the strength mainly of constitutional symptoms, but where the physical signs found in the chest are equally suggestive of an early active focus or of an obsolete lesion, are we entitled to be biassed in favour of tuberculosis by symptoms such as low fever, night sweats, lassitude, etc.? The writer's view is that such a course is not justifiable until every other source of toxæmia has been investigated. It may seem pedantic to lay stress on this source of error, but such criticism will not be levelled by anyone familiar with the protean manifestations of, to mention one form only, alimentary toxæmia. The following are

the more important groups which those responsible for the care of tuberculous subjects should be careful to differentiate :

Alimentary Toxæmia.

The term "alimentary toxæmia" is one of the blessed phrases which serve so often in medicine to suggest the existence of accurate information on a subject where a rather surprising inaccuracy of information is the rule. Of course, full understanding of pathological conditions cannot reasonably be expected where physiological data are as yet incomplete, and it is sufficient for the tuberculosis officer to recognize that the condition does exist, that the constitutional disturbance may be profound, and that definite localization of the infected area may not be possible. He may accept the definition of Andrewes that it is the result of absorption (from the alimentary canal) of chemical poisons, toxic proteins, as well as bacteria, and may add that, apart from absorptions from any part of the tract through damaged or undamaged walls, it includes the more immediate effects of inflammation or ulceration of the mucous membrane when these are present. In this way he can avoid the more acute ætiological controversies as to the rôle of various sections of the alimentary tract, or of various secreting glands in the causation of the toxæmia. Nevertheless, whilst the interrelations of these various factors is not clearly understood, and accurate subdivision consequently impossible, it is permissible to consider the different sections of the alimentary canal in their relation to particular forms of toxæmia, ignoring largely their interrelations, and laying emphasis on the symptoms more likely to suggest a tuberculous infection. These symptoms are, of course, varying degrees of constitutional disturbance, including fever, and, in the case of the upper tracts, cough and even sputum. In this way all symptoms, as Daniel points out, must be considered in a double sense—viz., local and septicæmic. The local condition, inflammatory or otherwise, may be sufficient of itself to account for ill-health, or it may set up disorder in some other part of the tract, with a consequent toxæmia. A third case might be stated, where, in addition to the local condition and its sequelæ, a coincident disturbance of other parts of the alimentary canal exists. Take, for example, *pyorrhœa alveolaris*. We need not enter into the question whether pyorrhœa is merely a determining cause of toxæmia (Hale-White, Coleman, and many others), or is itself determined by the presence of intestinal stasis (Lane), although on this point the figures of Goadby are of interest. The latter found that of 150 cases where pus had been swallowed for two years, 24 per cent. had no symptoms and 42 per cent. symptoms of gastro-intestinal

disturbance. We need not consider either the pessimistic view of observers such as Turner, who chronicles about thirty distinct disorders due to pyorrhœa, but we must realize with Hale-White that very many persons owe their general ill-health, and some few their death, to this condition. Moreover, as Hecker shows, the mouth lesions themselves may give rise to notable disturbance. In the same way, as has been emphasized by Combe, the influence of *nasal catarrh*, unrecognized *sinusitis*, *adenoids* and *hypertrophy of tonsillar crypts*, may, apart from local symptoms (of which cough is not the least), give rise to decided toxæmia as the result of deglutition of pus. Lower down in the alimentary tract there is still more intimate connection between local disorders and general ill-health. We need only point out, with regard to the different varieties of *dyspepsia*, that most writers on tuberculosis describe a dyspeptic onset of phthisis. Grancher, it may be remembered, said "all tuberculous subjects have been, are, or will be dyspeptics"; and, while this standpoint is really a legacy from the days of "late diagnosis," the connection between these disorders is sufficiently close to give rise to occasional errors in diagnosis. More intimately associated with general toxæmia, and, in consequence, with tuberculosis, is a condition of *gastric stasis* or *gastric dilatation and incompetence*. This has been noted by, amongst others, Minor, Cabot, Hale-White, Combe, Andrewes, and Armstrong. Toxæmia of *hepatic origin* is recorded by Hale-White due to alteration of normal substances in the liver into poisons, and *gall-bladder infections* are instanced by Andrewes. On the rôle of *intestinal stasis* in the production of toxæmia there is now general agreement. It is needless to enter into the various controversies which surround this subject: whether, for instance, the cause is primarily obstructive (Lane) or due to defects of innervation (Keith); or, if obstructive, whether Lane's bands are early factors or late (McClure); whether the toxins are bacterial or the results of protein decomposition; and, if protein in origin, whether the decomposition is set up by bacterial action or by ferments, or by both acting and interacting. These discussions, with others on the aromatic content of the fæces, their moisture or dryness, acidity or alkalinity, the permeability of different mucous membranes, etc., cannot detract from the value of recognized clinical manifestations of stasis, and whilst admitting that toxæmia is not proof of stasis or stasis of toxæmia, the existence of toxæmic stasis can no longer be denied. In the same way, although it is recognized that *constipation*, particularly of the lower end of the colon, is not incompatible with well-being, there is a great deal to be said for the view of Mantle that *chronic constipation with catarrhal inflammation of the colon* is one of the more

common causes of toxæmia. This brings us definitely to cases where damage to the intestinal wall is an all-important factor, and, to be brief, we have to recognize two all-important conditions—viz., *mild catarrh of the small intestine* and *mucoous colitis*. It is certainly not realized how insidious, how chronic, how intractable, these conditions may be, and how profound the resultant toxæmia often is.

The Symptomatology of Toxæmia.

It may seem a far cry from toxæmia to tuberculosis—although in Lane's opinion the one is merely the next-door neighbour of the other—but a short survey of the symptomatology of toxæmia will show that the claims of the foregoing diseases on the consideration of the tuberculosis expert are not to be scouted or lightly set aside. It must be emphasized that, so inured is the body to varying degrees of alimentary disorder, there is often little to account for the resultant toxæmia, even when health has become seriously undermined. It is natural, then, that should a patient present himself with a history of gradual ill-health, of weakness, headaches, incapacity for work, loss of energy, gradual loss of weight, loss of appetite, flushings, night sweats (sometimes profuse), with clinical evidence of malnutrition, of tachycardia, and with a persistent low fever, the suspicion of early tuberculosis must inevitably arise, and all these symptoms be fathered on a slight infiltration at an apex, if such be found. But it cannot be stated too categorically that the true paternity may lie with an alimentary toxæmia. Remember that the form of tubercle to be confused with toxæmia exhibits just these toxic symptoms, and often with very little evidence of lung involvement. It is true that few descriptions of alimentary toxæmia have been given. Throughout the protracted symposium of the Royal Society of Medicine on this subject there is hardly one clinical picture worth studying, but here and there we may gather evidence as to the frequency of toxic symptoms common to both diseases. On the more general symptoms there is a consensus of opinion of which the following are examples: fatigue, constant weariness (Mantle); lassitude, headache (Hertz); drowsiness, lassitude and irritability (Somerville); prostration, restlessness, headache, irritability, torpor, fatigue (Brook); never feeling well until midday (Armstrong); pallor, sickness, loss of appetite, headache, loss of energy (Combe). On loss of weight there is similar agreement. Hutchison includes in his summary of symptoms loss of fat and wasting of voluntary and involuntary muscle. Cabot says, "A rapid loss of superfluous fat . . . may give rise to grave apprehension, though the general health remains good and no known disease develops." Amongst other causes, all of them

alimentary, he notes chronic dyspepsia, with gastric dilatation. Hertz refers to cases with emaciation; and Combe says that the thorax may be emaciated and the skin dry, greenish-grey, and desquamating. He also notes the occurrence of night sweats, often profuse, particularly in children, and of simple tachycardia, flushing after meals, etc. There seems to be no doubt that a persistent fever is a common symptom in this disease. Charrin proved, experimentally, that a small quantity of injected toxins provokes an excessive generation of heat, and pyrexia is noted by Hale-White as an accompaniment of carbohydrate dyspepsia in children. Dawson observed attacks of fever in the case of a boy, and Mummery found fever registering 102° - 103° F. at night in later stages. Combe says the temperature may rise 100° - 102° F. in gastric crisis from auto-intoxication, and that when toxic patients exercise after a meal the fever may reach 100° - 101° F., "*and that without any other reason.*" In cases of great exertion the register might be 102° F. He notes also that absorption fever is sometimes inverse. Hutchison says the temperature may be subnormal, and Comby finds the same condition in children. Minor observes that patients with dilated stomach and retention can run a suspicious temperature. In the case of chronic colitis, Herschell and Abrahams point out that the patient's muscular power is lessened, and he complains of fatigue; he never feels quite well; there is a lessened power for mental work, and loss of mental concentration, whilst headache, sleeplessness, loss of appetite, furred tongue, dyspepsia, and anæmia, are all met with. The general nutrition suffers, especially if the small intestine is also affected with catarrh. To quote their exact words: "Patients frequently lose from 15 to 30 pounds weight, and especially in the cases with a raised temperature, a suspicion of tuberculosis is needlessly aroused. Cases are often febrile. In others the fever may be constant, intermittent, or transitory." "Not infrequently mistakes of diagnosis occur, as the patients omit to mention their symptoms of colitis." Herschell and Abrahams go on to quote Couto, who finds several different types of intermittent fever which are frequently mistaken for malaria; and, again, that fever may persist *for months*, running 99.5° - 100° F. at night. On the question of whether colitis is not self-evident, and, therefore, not likely to cause confusion with tuberculosis, Herschell and Abrahams say: "Apart from muco-membranous colitis the existence of chronic colitis has remained almost completely unrecognized." "Nevertheless," they add, "the majority of cases never reach this stage. . . . As an inevitable consequence all sorts of other conditions are diagnosed." Combe, dealing with auto-intoxication, says, "occasionally general symptoms are alone evident, the intestinal cause being masked,"

and in the writer's opinion this contingency arises frequently rather than occasionally. But the association between lung and bowel does not depend solely on general symptoms. Combe describes a condition of *pneumonism* after auto-intoxication which, he says, is frequent in children. The patient is dyspnoëic, and runs a temperature of 102.2° – 104° F. from two to several days at a time. The physical signs vary. Bronchial breathing may be heard at the left base, disappearing next day to give place to râles, and there may be bronchial breathing at the apex of the other lung. Comby notes in children a dyspeptic asthma with rhonchi and sibilant râles; whilst Mantle says that in chronic constipation with catarrhal inflammation of the colon there is sometimes a general infection of mucous membrane which often reaches to the bronchi, and may set up asthma, etc.

Hutchison includes breathlessness on exertion amongst his symptoms of toxæmia, and says that the latter must be distinguished from, amongst other conditions, tuberculous infection; whilst Smith goes so far (probably too far) as to say that 90 per cent. of the cases of cough and wasting in children are due to intestinal derangement only.

From this general consideration of the subject we may turn to cite actual instances of diagnostic error. The following is a good example:

CASE 1.—The interesting feature in this case lies in the fact that the patient was a medical practitioner who took from the first an intelligent interest in his condition. Patient, æt. 32, had had a chronic cough with traces of sputum in the morning for several years, but until one year prior to examination his general health had been good. From this time on symptoms of general disturbance of health became pronounced. These included lassitude, loss of capacity for work, feeling of malaise, and headache. Dyspnoea on exertion began to develop, and tachycardia was noted. The temperature was found to run from 97° F. in the morning to 100.8° F. at night, with extremes of 96.2° F. to as high as 101.2° F. Night-sweats were frequent and profuse, but rather erratic in incidence. The sputum was frequently muco-purulent, and when pain developed at the apices the patient became convinced that he was in the early stages of phthisis. Examination showed only a slight alteration of the breath sounds at the right apex. The sputum was negative to sedimentation tests, and the complement fixation reaction and opsonic index were completely negative. The temperature seemed to improve on exercise, and the body weight under super-alimentation was above normal. He was given a completely negative report as far as tuberculosis was concerned, but remained convinced that he was an early case of phthisis. Four years later, however, he was still free from any signs of tuberculosis, and in the meantime, after various examinations by different specialists, it was shown that he was suffering from acute toxæmia, due to inflammatory changes in the wall of the upper intestine, together with a developing muco-membranous colitis. This explained all the general symptoms, including some anæmia. The cough and spit were merely the result of chronic pharyngitis, and the pains in the chest due to toxic fibrositis.

A more typical history of commencing phthisis could hardly have been given, and the resemblance to this condition is emphasized by the scepticism with which the patient—a medical man—received

his negative report. Another interesting point is that in the retrospect he was able to piece out a connected history of alimentary intoxication, but at the time of examination it was not a factor of any weight from the subjective point of view.

CASE 2.—Female, æt. 18, was admitted to a sanatorium as a notified case of pulmonary tuberculosis with a history of gradually increasing ill-health over a period of one year. She had some cough but no sputum, and her chief complaint was of extreme lassitude, lack of physical energy and of mental concentration, loss of weight, occasional night-sweats, and a persistent low fever, rising, as a rule, at night to 99.6° – 100.2° F., with a rather indefinite "menstrual cycle." Physical examination showed definite infiltration of the left apex, but there were no moist sounds. Her complement fixation reaction and tuberculo-opsonic index were negative, and her temperature did not react to variations in rest and exercise. On the other hand, the sallow complexion, low blood-pressure, mild degree of anæmia, history of constipation and occasional abdominal pain, suggested an alimentary toxæmia which detailed analysis of the urine confirmed. She was dismissed as a case of toxæmia, the lung lesion being regarded as obsolete. A year later, her ill-health and low fever continuing, she was given a series of test doses of tuberculin subcutaneously, the temperature being ignored. She gave no focal reaction, although a notable constitutional reaction, to the last dose (0.01 c.c. A.F.). The urine continued to indicate some inflammatory changes in the wall of the small intestine, and she was again dismissed as a case of toxæmia. Three years later there is no indication of active lung disease, although the general ill-health and lassitude is still a notable feature.

CASE 3.—Male, æt. 27. History of gradual ill-health over two years, slight continual cough and traces of sputum, occasional night sweats, tachycardia, particularly after even mild exercise and after meals, occasional attacks of fever (99.8° F.), lasting a few weeks at a time. There was a definite infiltration of the right apex, but no moist sounds. Sputum was free from bacilli, and soon disappeared under sanatorium conditions. Complement fixation reaction was weakly positive, but the opsonic index, although rather high, did not fluctuate. The flushings, low blood pressure, history of habitual constipation, and habitual taking of laxatives, suggested an alimentary toxæmia which a subsequent urine analysis showed to be acute. There were indications of inflammatory changes in the upper bowel, and physical examination showed a definite gastric atony. Four years afterwards there is no sign of active lung disease, and the general ill-health, although not greatly abated, improves with judicious control of diet, etc.

CASE 4.—Male, æt. 30, notified as a case of pulmonary tuberculosis, with a history of gradual ill-health, loss of appetite and weight, occasional night-sweats, some cough, but no sputum. The temperature was normal. There were signs of infiltration at the left base of the lung, but no moist sounds. The serum reactions were negative, and he did not give a focal reaction to 0.01 c.c. A.F. tuberculin subcutaneously. The teeth were very defective, five being completely carious; there was a good deal of gingivitis, and some pyorrhea alveolaris. This, together with the history of dyspepsia and other toxic symptoms, indicated a possible cause of ill-health. A "clearance" was suggested and later on effected, artificial dentures being supplied. Two years later patient is in good health, of normal weight and working capacity, and shows no sign of active disease of the chest.

These examples are but a few of the more instructive cases which have come under the writer's notice; and in many others with a similar diagnosis all that is wanting is a definite after-history, which is not always obtainable. In the writer's opinion no obscure case with toxic symptoms should be written down as a case of tuberculosis, even where the lung is obviously infiltrated, unless there are definite signs of activity of the lesions either by physical

or serum examinations, and until a careful examination of the alimentary tract and excretions prove that there is no evidence of alimentary auto-intoxication.

Primary and Secondary Anæmias, and Toxanæmia.

To avoid undue prolixity we may take liberties with the usual classifications of anæmia, and deal in the same section with the more obscure forms of primary and secondary anæmias. After all, as Krehl points out, it is often impossible to distinguish between them, and, on the whole, the symptomatology in the early stages is very much alike except, perhaps, in the case of chlorosis. Strictly speaking, the secondary anæmias of toxic origin would include those accompanying malignant disease, gastro-intestinal disease, uterine tumours, chronic metallic poisoning, syphilis, malaria, diseases of the liver, kidney, and heart; but in their relation to tuberculosis the most important are *anæmia of gastro-intestinal origin* and the *anæmia of chronic metallic poisonings*. Of the primary anæmias, excluding for practical purposes all discussion as to a possible toxic origin, *chlorosis* requires special consideration, and, in a few instances, *pernicious anæmia* in its early stages. In the case of *intestinal toxæmia*, a degree of anæmia is a common feature. Goadby observed it in 66 out of 150 cases of intoxication following pyorrhœa, and Hunter declares that it may be extremely severe. According to Combe, anæmia frequently occurs, and the blood-count runs in the average 3,000,000 to 3,500,000 R.B.C.'s, with 50-70 per cent. HbO. It is well known that severe anæmia may develop as a result of *chronic colitis*. There is no need to detail the symptoms which in such cases might suggest an early tuberculous lesion; these are practically identical with the symptoms given in the previous section, the only difference being an increase in the severity of the toxæmia, and particularly of dyspnœa. With the milder forms of *chronic metallic poisonings* the anæmia is associated also with general disturbance of health, and in the tuberculosis dispensaries in industrial districts a careful watch must be instituted to exclude certain trade diseases, particularly *plumbism*. If there can be any doubt as to the expediency of including the foregoing anæmias in the differential list of tuberculosis, there can be none in the case of *chlorotic anæmias*. Curiously, Trousseau gave the name of "Chlorosis" to the anæmia often noted as accompanying tuberculosis; and, to come down to more recent times, Landouzy and Labbé describe a "*tuberculose à forme chlorotique*." Allbutt, referring to the diagnosis of chlorosis, says, "the anæmia which precedes an outbreak of pulmonary phthisis or tuberculosis elsewhere may create embarrassment in some cases"; and Piéry, who

holds that anæmia is rarely absent in pulmonary tuberculosis, is emphatic that undetermined cases of chlorosis are tuberculous in nature. On the other hand, Fowler says, concerning delicate-looking women suffering from anæmia, "in such cases, and in cases where the symptoms suggest tuberculous disease, but the physical signs are of doubtful import, and there is no expectoration, it is a golden rule never to make a diagnosis of tuberculosis from doubtful physical signs." It is unnecessary to consider in detail the symptoms giving rise to confusion: the disturbance in general health, lassitude, dyspnœa, and so on, are common knowledge. On the question of fever there is some difference of opinion, some holding that chlorosis is afebrile, rises in temperature being found only in pernicious and toxic anæmia, others that rises of temperature for a few weeks at a time are not uncommon. There seems to be little or nothing to distinguish the blood-counts and hæmoglobin estimations in chlorosis and in tuberculous anæmia, although in the latter the specific gravity of the blood-plasma is said to be lowered. Piéry, however, gives a different blood-picture for five of the chief forms of pulmonary tuberculosis, and believes that only in "abortive" or benign forms of tuberculosis, and in latent forms, does the anæmia closely resemble chlorosis. If this be so, there seems all the more reason for accuracy in differentiation. The following case is typical of the difficulty:

CASE 5.—Female, æt. 25, admitted to a sanatorium as a notified case of tuberculosis; history of cough, but no sputum for some months back; general ill-health for several years, dyspnœa, tachycardia, and occasional night-sweats. The physical signs showed an infiltration of the right apex, but no moist sounds were present. Her complement-fixation reaction and opsonic index were found to be negative, and she gave no focal reaction to *ov* tuberculin A.F. subcutaneously, but had a marked constitutional reaction. Her blood-count was R.B.C.'s 3,300,000, HbO 62 per cent., differential count normal. She was discharged as "not suffering from active tuberculosis."

Other Causes of Constitutional Disturbance simulating Tuberculosis.

The preceding groups will be found to cover most of the ground of general toxæmias, but it will be clear that *chronic pyogenic infections* must also be capable of disturbing the general metabolism. When these infections lie in the *uterine adnexa*, but do not give rise immediately to definite localizing symptoms, possibility of error in diagnosis exists. Even apart from pyogenic infections in this region, disorders of the generative system occur so frequently amongst adolescent women, and exercise so baneful an influence on the general health, that a full investigation of this tract is frequently called for before a final diagnosis of commencing tuberculosis is arrived at. We have already noted *uterine tumours* as

a cause of anæmia or toxæmia, and the writer has noted quite a number of cases where, after a diagnosis of tuberculosis had been made on the strength of signs of inactive disease of the lung, the patient has been handed over to the care of the gynæcologist with satisfactory results. To return to pyogenic infections, mention must be made of the rôle of obscure chronic infection of the *appendix*, although, strictly speaking, this might have been considered under the heading of alimentary toxæmia. Recently the writer has carefully observed a case where chronic *septic tonsillar follicles* gave rise to grave suspicion of commencing phthisis. The patient had all the symptoms of an early focus—high fever, night sweats, etc., and the fever (rising to 100°-101°-102° F.) persisted for several weeks. No active signs could be found in the lung, and the tonsils, though seemingly normal, proved to be thoroughly septic. A history of recurring sore throat was obtained.

Griffiths reports a case where *ulcer of the left tonsil* caused a mistaken diagnosis of phthisis, and Griffiths and Wilkinson others where abscess of the *antrum of Highmore* gave rise to a similar error.

Summary and General Conclusions.

Briefly, the position of toxæmia and of toxanæmia in the diagnosis of tuberculosis may be summarized as follows: In many cases of lung disease the physical signs are insignificant in comparison with the acute disturbance of general metabolism which accompanies them; indeed, it is possible for no definite signs of activity to present themselves in the lung. On the other hand, similar disturbance of metabolism may be caused by non-tuberculous disease, chiefly of the alimentary, the hæmopoietic, and generative systems, and that without any definite localizing symptoms. Again, these latter disorders may be associated with the existence in the lung of a healed, or obsolete, tuberculous lesion giving rise to definite physical signs of infiltration. Consequently, where the signs of lung disease are indefinite, and where at the same time the symptoms of general toxæmia are prominent, a careful examination of these systems is essential to prevent occasional miscarriages of diagnosis.

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THE TREATMENT OF PULMONARY TUBERCULOSIS.

By J. E. BULLOCK,

M.D.,

Acting Tuberculosis Officer for the County of Northants.

I WISH in the following article to consider some of the phases in the treatment of pulmonary tuberculosis which come before a County Tuberculosis Officer. He has to seek out early cases and to send such to a sanatorium. The value and limitations of sanatorium treatment have recently been reviewed and fully discussed. I think it will be conceded that if only early cases were sent to a sanatorium there would be no question as to the permanent value of sanatorium treatment, but many cases beyond the incipient stage are now being admitted. In my opinion they may derive great benefit from the experience gained, though, of course, the limitations of a cure are proportionately restricted. Among the working classes it is very difficult to get the early case to go to a sanatorium. At the present time men are either at work or serving in the Army; in the latter case signs and symptoms are arrested by military training, or the man breaks down and is discharged with a "recommendation for sanatorium treatment." In addition there are many civilians beyond the early stage whose disease is much benefited by sanatorium life and the patient is restored to a fair earning capacity. I impress on patients whom I send to a sanatorium that they go there for two reasons: (1) To learn how to live so that they can carry out exactly the same lines of treatment when they return home; (2) to get set up in strength so that on leaving they can at least do something towards earning their own living. I strive to

send to a sanatorium only such patients as may reasonably be expected to gain some earning capacity, or, in the case of married women, may be able to take up their household duties. These objects can only be maintained if Care Committees are formed to assist such cases by giving financial aid to supplement any limited earning capacity or to provide further accommodation when the home conditions are overcrowded.

It must be remembered that consumption is slow and insidious in its development, very general in occurrence, and is resisted by maintaining a healthy state of the body. Treatment is not a matter of a few months at a sanatorium, it must continue from the moment the disease is discovered until all signs and symptoms have been absent for something like two years. Thus treatment resolves itself into putting the patient into healthy conditions and maintaining those conditions. As a patient must live at home during the greater part of his treatment, our efforts should be directed towards looking after his home and finding him suitable employment, by which he can earn something towards his maintenance. Suitable occupation for a consumptive is a most difficult thing to find; the chief points to remember are that he will not be able to earn a full wage, and that it is no good his attempting work for which he is not fitted. Some men frighten would-be employers by asking for "a light job in the open air." Now that allotments are becoming universal, I find capital scope for a man who is really a gardener, but it is useless to expect any profitable work in that line from a clerk or a mechanic; the clerk must be put into a healthy office, the mechanic can find suitable engineering work, and in such cases application from the Tuberculosis Officer is often successful in obtaining employment. In the case of the shoe-hand (the most usual employment in North Northants) outdoor workshops might be instituted adjoining the premises of patients, or in the garden (if such exists) connected with the dispensary building. I have had erected a wooden shelter in the garden of a patient who works there regularly with his wife, earning a good wage at "clicking."¹ I have other patients who similarly devote a room in their own houses to their work. Many industries belonging to a neighbourhood might be re-established, piece-work being given out by employers on the request of the Tuberculosis Officer.

Colonies for consumption have been much discussed lately. Farming which involves regular hours is in my experience impracticable. Industrial training colleges would be excellent; in these men and women could be trained in various industries to which

¹ Illustrations of this Shelter appeared in the April issue of the *BRITISH JOURNAL OF TUBERCULOSIS*, pp. 92 and 93.

TREATMENT OF PULMONARY TUBERCULOSIS 129

they are accustomed. Substantial help may be expected from the Government in training ex-service men. When trained they would either remain on and train others or they would earn their own living outside the colony.

Besides the early and the more pronounced cases there is a third class of patient who must be considered: advanced cases who, owing to lack of suitable provision in hospitals, have to remain at home. In the worst of these cases it has been suggested that compulsory powers should be granted to the Medical Officer of Health and the Tuberculosis Officer by which, on their joint certificate that the patient is liable to infect others of his household, he could be removed to some special institution (if such exists), where he can be isolated. It has been thought that the grounds connected with isolation hospitals could be used for this purpose; there appear to be many difficulties in carrying this out, irrespective of arranging suitable buildings and staff. Before compulsory powers are entertained provision should be made in a special institution to which advanced cases can go on the recommendation of the Tuberculosis Officer. If the patient is allowed regulated visits by his relatives he will recognize that he leaves home for the welfare of his family, he will probably improve and wish to stay; but if he do not improve he may go home again if he so wishes, rather than die in the institution. My impression is that in an institution on these lines no compulsion will be needed, and that as many patients will avail themselves of the opportunity as there are beds to receive them. The need of such an institution is most urgent if consumption is to be stamped out.

A SCHEME FOR THE HOUSING OF CONSUMPTIVE FAMILIES.

By JAMES T. NEECH,

M.D., D.P.H.,

Medical Officer of Health for the Borough of Halifax, Yorks.

It must be admitted that although sanatorium treatment has not so far given the beneficent curative results at one time anticipated from it, yet nevertheless it affords the best known treatment for tuberculosis at our disposal. The sanatorium at present is to be viewed first and foremost as a curative institution: it tends to act only indirectly as a preventative agent. Patients are not sent to a sanatorium until they are victims of tuberculosis, and if the disease is to be materially diminished in our midst greater attention will have to be paid to

methods of prevention. It has often been said, and with truth, that patients are sent to a sanatorium and marked improvement results, but that, after their return to their home conditions, they soon relapse again.

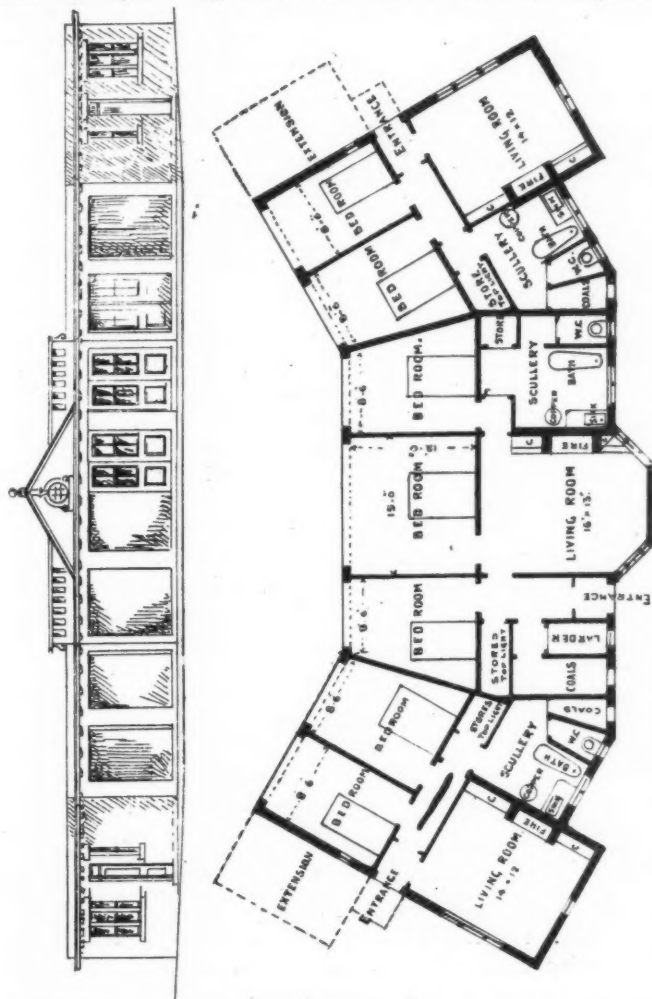
It has also been repeatedly shown that in congested urban areas the incidence of tuberculosis is greatest. In connection with this, however, I must point out that in congested areas rents are usually cheaper; and the consumptive is often ailing for some time before he finally breaks down. If it be the breadwinner who is affected, income becomes reduced, and no doubt such families tend to gravitate to congested areas on account of cheaper rents, thereby adding to the number of consumptives in such districts and increasing the number of centres of infection therein.

In ill-ventilated and badly lighted areas the tuberculous material remains longer virulent, and is more likely to infect others, whereas in districts exposed to the beneficent influences of fresh air and with a plentiful supply of sunlight such as obtain at a sanatorium the tuberculous virus will sooner lose its potency and be less likely to be transferred to others.

If open-air treatment is to be more effectual in the future than our experience has shown to be the case in the past, in my opinion such measures as are applied must be more of the nature of preventative agents. The susceptible cases—those persons who are predisposed to the disease—must be given open-air treatment before and not after they have developed the disease. Steps must be taken to build up their constitutions, and, as far as possible, counteract the tuberculous predisposition. They must be rendered less susceptible. At the same time they must be placed under such conditions as will be less likely to lead to infection of others. To carry out these ideas involves the submission of whole families in which there is a sufficiently marked predisposition to open-air treatment. It is apparent that it is impracticable to provide sanatoria for the reception and treatment of whole families. I think, however, that it is possible to provide open-air treatment for them, and this brief paper is an effort to explain a practical scheme.

I suggest that a suitable site, as well sheltered from the cold winds as possible, should be secured, and, if practicable, within reasonable access of trams, so that those of the household who are fit can get to their work and the children reach their school. Upon this site should be erected cheaply constructed bungalows. The bungalows should be built in pairs, or perhaps in blocks of three, and each must be provided with a garden. I think the bungalows should vary in size and provide two-roomed, three-roomed, four-roomed, and five-roomed dwellings, so that small as well as fairly large families could be accommodated. The bedrooms should be of the pavilion and open-air type, and situated on the south side of the buildings.

The bungalows could be built of concrete or constructed with concrete slabs, and under normal conditions should be much less costly than ordinary dwellings. So soon as the best form of bungalow was



BUNGALOWS FOR THE HOUSING OF CONSUMPTIVE AND PREDISPOSED TUBERCULOUS FAMILIES.

decided upon it could be standardized to exact patterns so that the buildings could be easily and quickly put together. This method would also cheapen their construction.

The scheme could be initiated on a small scale at first, and

extended as and when desired. When a considerable extension became necessary and was accomplished, a resident nurse could be appointed to attend to any sick cases and see that open-air treatment was properly carried out. Special and suitable families should be selected for residence in the bungalows. The family should be one which is predisposed to the disease. One or more members thereof should have had sanatorium treatment. The family should undertake to properly carry out open-air treatment, because unless they would do this the benefit of the scheme would be lost. We can only help those who will help themselves. Additional bedding, and even food, could be provided in necessitous cases, especially if a resident nurse were in charge.

This scheme would not only remove consumptives from congested areas into more healthy surroundings, but would also give them the opportunity of a prolonged open-air treatment, and would enable the other members of the family who would be usually more or less predisposed to the disease to receive treatment before they became infected with the disease instead of afterwards, and thereby improve their health and render them less susceptible to infection as well as reduce their chances of becoming infected through being placed in a more healthy environment.

The medical profession are practically unanimous in the opinion that housing conditions play an important part in the causation and spread of this disease, and the lay mind, at any rate all those who have had any experience in the matter, hold the same view; yet, so far as I am aware, no serious suggestion has been made in this country to deal thoroughly with this matter, and no definite steps have been taken to provide suitable houses for this class of the community on a scale commensurate with the needs that exist.

It is true that great housing schemes are now under consideration, but when they are completed such houses will be beyond the means of the majority of the consumptives, but even if a due proportion of consumptive families succeeded in securing these new houses the problem I have called attention to would still remain practically untouched. Moreover, these houses would not offer the facilities for open-air treatment which the scheme here advocated provides for.

I am indebted to Mr. J. F. Walsh, F.S.I., architect, Halifax, for the design and drawings from which the accompanying illustrations have been prepared. Mr. Walsh has made a special study of constructing buildings with concrete, and he informs me that these bungalows would lend themselves to that form of construction. Also that standardization of the buildings could be readily adopted, so that extensions could be carried out on similar lines for two- and three-roomed houses as well as the sizes shown in the illustrations.

INSTITUTIONS FOR THE TUBERCULOUS.

THE LEICESTER BOROUGH SANATORIUM.

THROUGH the courtesy of Dr. C. Killick Millard, Medical Officer of Health for the Borough of Leicester, we are enabled to present the following interesting account of the development and work of the Municipal Sanatorium for tuberculous cases at Leicester:

The Municipal Sanatorium for the Borough of Leicester was opened in May, 1915. After a consideration of various alternative sites and schemes, it was decided to build on a seven-acre pasture field adjoining the Borough Isolation Hospital. This was exceptionally well suited for the purpose, being on sloping ground, facing south, commanding a very pleasing prospect, and yet situated only a mile from the outskirts of the town. Being so conveniently close to the Isolation Hospital, itself quite a modern building, and capable of accommodating 250 patients, and with an excellent administrative block, it was decided that a separate administrative centre was unnecessary. The two institutions are, therefore, administered in common as a combined institution. Experience has fully justified this arrangement, for not only has there been a substantial saving in the original outlay, but what is, of course, much more important, there is economy and efficiency in working, it being always more economical and easier, within certain limits, to administer one large institution rather than two small ones. Moreover, it is easier to secure efficient nurses, and much more varied experience can be given than would be given in an institution devoted solely to tuberculosis. *The New Buildings* were erected on the plans of a local architect, Mr. A. H. Hind. The plan decided upon and approved by the Local Government Board was similar in general design, though with some important modifications, to the model designs issued by the Board. There are two separate buildings: (a) The sanatorium proper, for curable or ambulatory cases; and (b) the hospital block, for advanced or bed cases requiring "hospital" treatment. *The Sanatorium Block* consists of two elongated single-story wings, one for either sex, each divided into ten double-bedded rooms, and separated by a dining and recreation room, at the rear of which is a kitchen or "servery," together with doctors' and nurses' rooms, store-rooms, etc. Beneath the kitchen in the basement there is a heating chamber with slow-combustion stoves. The lavatories and bath-rooms are in the centre of each wing, with w.c.'s, etc., in the rear. The bedrooms open back and front upon verandas, that in front, towards the south, being eight feet deep, and having a glazed roof. The veranda in the rear of the bedrooms is only four feet deep, and is not glazed. The doors leading on to either veranda are wide enough to enable beds to be easily wheeled in and out. The floors of the bedrooms are of cement, and are continuous with the flooring of the

verandas, that of the front veranda being continued outward for six feet beyond the veranda. The object of the rear veranda is to afford access from the bedrooms to the w.c.'s and lavatories when rough weather is coming from the south; but when rough weather is coming from the north the front veranda serves equally well. The bedsteads are those known as "The James," these being considered the most easily wheeled bedsteads obtainable, being fitted with an undercarriage near the centre of gravity. They are easily wheeled in and out by one person, even when a patient is in bed, and they have the advantage over any other type of bedstead that they can easily be manœuvred over differences of level in the floor of one or two inches without jolt or jar. The dining-room is divided by a folding screen into two equal halves, one for either sex, but can easily be thrown into one large room for combined gatherings on Sunday evenings, etc. The dining-room is heated by open fire-grates and hot-water radiators. In the rear of each wing are four single-bedded sleeping shelters, which increase the accommodation for each sex to twenty-four, or forty-eight for the whole block. The *Hospital Block* consists of two hospital wards, each to hold twelve beds for either sex, and separated by duty-room and kitchen, bath-rooms and other offices. There are also two side wards for special cases. W.c.'s are situated in an annexe at rear of each ward. An eight-foot glazed veranda runs along the south aspect of each ward, access to this being given by wide folding-doors. On the north side there is a cemented area with similar access by wide doors, this being intended for use in summer-time when the glazed veranda becomes unpleasantly hot. The flooring of this block is of hard wood polished. The cement floor of veranda is carried out beyond the veranda, so that in fine weather the beds, which are also of "The James" type, can be wheeled right into the open. The verandas of this block are protected by specially strong "festoon" blinds, so that in rough weather they can be closed in. This enables patients to sleep out in the verandas summer and winter, and incidentally it enables the available accommodation to be substantially increased if necessary without overcrowding. As a matter of fact, a number of patients do sleep outside by choice at all seasons of the year. Although the hospital block was intended for patients of either sex, it has, as a matter of fact, been exclusively used for females only, male hospital patients being accommodated in one of the blocks belonging to the Isolation Hospital. This was because—owing to the admission of Poor-Law patients by special arrangement with the Guardians (arising out of the war)—more accommodation for hospital cases was required than was originally provided for. The wards are heated by an open fire-grate at each end, which adds greatly to their cheerfulness, and by hot-water radiators heated by slow-combustion coke stoves fixed in a basement. Each ward is subdivided by a glazed partition, which facilitates classification of patients, and has been found a great advantage. Dinners for both blocks are cooked in the general hospital kitchen, and sent up in a specially constructed dinner-waggon. Breakfast and teas are prepared in the ward kitchens. The sanatorium has now been in use for three years, and the design of the building has proved in practice very satisfactory.

NOTICES OF BOOKS.

MEDICINE AND PROBLEMS OF EVOLUTION.

EVERY practitioner of medicine should be a student of evolution. In recent years increasing light on the problems of evolution has come from workers in medicine. A particularly valuable collection of masterly studies on the relationships of pathology to evolutionary hypotheses and practical researches has just been issued by Professor J. G. Adami, of McGill University, Montreal.¹ The first portion of the work contains Dr. Adami's much-discussed Croonian Lectures delivered in June, 1917, before the Royal College of Physicians of London, dealing with the great problems of adaptation and disease. Dr. Adami's many friends and admirers will be glad to have these Lectures included in this handsome collection of his chief publications, arranged in more or less chronological order under the respective headings of Heredity and Adaptation, and Growth and Overgrowth. Professor Adami has taken a foremost place in tuberculosis work in Canada, and in his new book touches on some few aspects of the tuberculosis problem. He reminds us that tubercle bacilli have been demonstrated in the tissues of mummies in the Herst collection at Cairo belonging to the twentieth dynasty or so. Dr. Adami as far back as 1899 brought together all available data bearing upon the difference between human and bovine tuberculosis and their causative agents. His present position may in some measure be indicated by the following quotation: "If, as Krumwerde of New York and others have shown, some 25 per cent. of tuberculous children under five years afford the bovine type, how is it that this type is almost unknown in adults? The evidence at our disposal indicates that quite a large proportion of cases of active tuberculosis are but the recrudescence of tuberculosis gained in childhood. May there not be a fallacy, therefore, in the argument that cases affording bacilli of the human type have been infected by other human beings? The relative rarity of bacilli of the bovine type in adults demands either that (a) the bovine infection acquired in childhood is peculiarly fatal, so that all affected die in their early years (and this is wholly contrary to the evidence at our disposal); or (b) that, on the contrary, in a large number of cases, it gradually dies out, and is replaced at a later date by infection from another human being with the *typus humanus* (and of this, again, there is no clear evidence); or (c) that gradually, through long residence in a human environment, the bovine form takes on the character of the human strain. The fact that we from time to time encounter inter-

¹ "Medical Contributions to the Study of Evolution." By J. G. Adami, M.D., F.R.S., F.R.C.P. Pp. xviii + 372. London: Duckworth and Co., 3, Henrietta Street, Covent Garden, W.C. 1918. Price 18s. net.

mediate strains seems to favour this third view. But to my knowledge no decisive observations have so far been made." Dr. Adami would attempt to eliminate the bovine type of bacillus by placing cattle in a restricted area, and killing such as give a tuberculin reaction. Then he would "supply the rest of Canada, and, if need be, the world, with sound stock, the danger of these cattle becoming infected from tuberculous human attendants being practically nil." He urges that "it would not be a difficult matter to insure that the whole original stock of Jersey or Guernsey cattle become absolutely free from this devastating disease, and that the value of the herds become markedly augmented." Dr. Adami's views on the inheritance of a tuberculous diathesis are suggestive, and merit thorough investigation. The whole work is full of information and inspiration, and exactly the sort which students of tuberculosis should make a point of studying.

MEDICAL DIAGNOSIS.

Every medical superintendent of a sanatorium, tuberculosis officer, and specialist in tuberculosis should make a point of studying at least one comprehensive work on medical diagnosis every year. Experts in tuberculosis are in danger of becoming too circumscribed in their practice, and almost inevitably the range of their vision suffers restriction. As a corrective of undue specialization and conservatism in medicine we commend the study of the new issue of Professor C. Lyman Greene's masterly work on "Medical Diagnosis."¹ While normally a fourth edition, the volume is virtually a new book. It is an up-to-date, all-embracing, scientific, and practical exposition of all that is of proven value in modern diagnostic methods. It is written by a long-experienced teacher of medical students, and affords just the guidance and enlightenment which the student and practitioner of to-day stands in need of. We would particularly commend the admirable sections on the examination of the thoracic viscera. Dr. Frank S. Bissett contributes a luminous section on Intrathoracic Radiography and Fluoroscopy, and the Roentgenographic Examination of the Lungs and Pleura. There is also a specially helpful section on Cough and Sputum. The signs and symptoms of the various forms of tuberculosis of the lungs are excellently presented. The newest methods of investigating cardiovascular affections are described in detail. A particularly valuable feature of the work is the able and generous way in which illustrations have been provided. To show how thorough has been the production of the book, it may be noted that the index runs to ninety-seven pages, each consisting of two close-set columns. Author, publishers, and all concerned in the issue of this notable, handsome, and serviceable volume, merit warm congratulations.

BOVINE TUBERCULOSIS.

In the Veterinary Medicine Series, issued under the editorship of D. M. Campbell, a collection of articles on Bovine Tuberculosis by

¹ "Medical Diagnosis for the Student and Practitioner." By Charles Lyman Greene, M.D., Professor of Medicine, Chief of the Department of Medicine, and Chief of Medical Clinic in the University Hospital of St. Paul, Minn., U.S.A., etc. Pp. xix+1302, with 14 coloured plates and 548 other illustrations. London: William Heinemann (Medical Books), 20, Bedford Street, W.C. 2. 1918. Price £2 net.

American experts appears in convenient book form.¹ It is estimated that the prevalence of tuberculosis among the live-stock of the United States entails an annual loss of \$25,000,000. "At the present time efforts to eradicate the disease absolutely from any particular State or territory by the method of requiring all animals to be tested and retractors killed are sure to meet with defeat, for the simple reason that the public at large is not ready for any such movement. We must go slowly, and educate the cattle-owner and the consumer of cattle products, showing them just what the disease is and how seriously it may affect them." So says the Introduction to this serviceable manual. The book provides a concise, reliable, helpful description of bovine tuberculosis and all questions relating to the problem. Much space is properly devoted to a consideration of tuberculin tests and their proper conduct. Many practical suggestions are presented regarding the control and eradication of the disease.

WORKS FOR MEDICAL ADVISERS AND VOLUMES FOR REFERENCE.

Dr. W. B. Drummond has accomplished a difficult task with conspicuous success. He has prepared a Medical Dictionary² which will be of particular service to all engaged in medico-sociological and medico-educational work, and may be used with advantage by both medicals and non-medicals. The work is concise, reliable, up to date, and eminently serviceable. It is admirably arranged, effectively illustrated by numerous figures and some fine coloured plates. There is an excellent section on Consumption, with striking illustrations of means for open air management. There are also sections on Tuberculosis, Tuberculin, Health Resorts, Climate, Exercise, Diet, and Dietetics, and much else likely to be helpful to those engaged in anti-tuberculosis work. The volume is handsomely got up, and is just the reference book which should be in the hands of ministers of religion, statesmen, educationists, and all classes of welfare-workers. A copy of this notable work should be available in every reference library in the land.

X¹ "Bovine Tuberculosis." By J. F. Devine, D.V.S., Instructor in Cattle Pathology and Obstetrics, New York State Veterinary College, New York City. With an Introductory Article by E. Z. Russell, editor of *The Twentieth Century Farmer*: A Discussion of the Intradermal Tuberculin Test by D. F. Luckey, D.V.S., State Veterinarian of Missouri; and an article on the State Accredited Herd by O. E. Dyson, D.V.S., former State Veterinarian of Illinois. Pp. 120, with 7 figures. Chicago: American Veterinary Publishing Company. 1917.

² "A Medical Dictionary." By W. B. Drummond, M.B., C.M., F.R.C.P.E., Medical Superintendent Baldoran Institution, Dundee. Pp. ix + 627, with coloured plates and numerous illustrations in black and white. London: J. M. Dent and Sons, Ltd., Aldine House, Bedford Street, Strand, W.C. 2. 1918. Price 10s. 6d. net.

PREPARATIONS AND APPLIANCES.

THE MONO-WHEEL STRETCHER CARRIER.

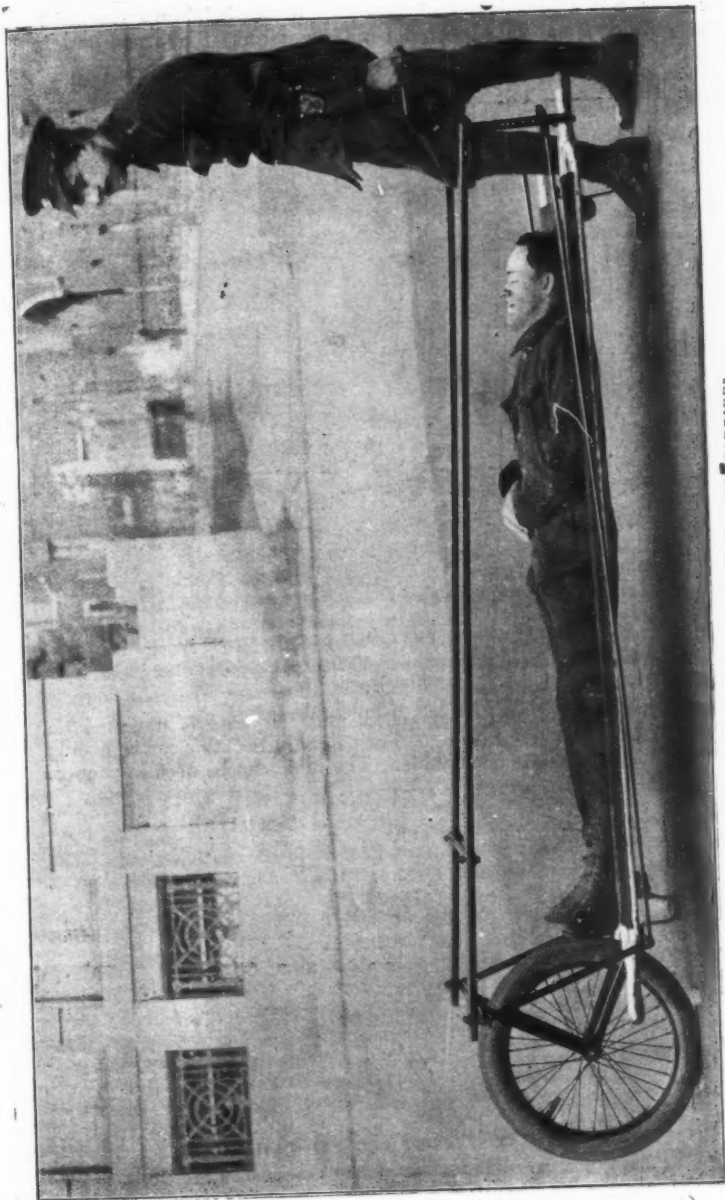
IN these days, when the best must be done for the sick, disabled, and permanently crippled, and at the same time man-power has to be conserved to the utmost, the new MONO-WHEEL STRETCHER CARRIER should be assured of an immediate welcome. Already it is being used for the care of wounded and diseased combatants. We believe the carrier would be found of great service in connection with the work of many sanatoria and hospitals for tuberculous cases. The chief features of this clever invention is shown in the illustration on p. 139. Where female nurses have to deal with adult crippled patients, the carrier should be of great service. The carrier will be particularly useful for taking patients from wards to open-air balconies or garden-shelters. It is entirely of British construction. It should also be noted that suitable "sunshades" can be adjusted to the stretchers. Patients can be left lying in the open well protected from the sun. The sunshade device is quickly attached to any stretcher, and can be placed at any angle. It is not a permanent fitting, and does not in any way interfere with the effectiveness of the stretcher.¹

A COMBINED PORTABLE BED-TABLE AND WASHING-STAND.

The comfort of many bedfast patients will be considerably increased by the introduction of the "AXIS" PORTABLE BED-TABLE.² This convenient, compact, and serviceable contrivance is admirably suited for use in sanatoria, hospitals, and like institutions for patients, and may be advantageously employed in connection with the work of colonies, camps, residential and open-air schools for consumptive and tuberculously disposed subjects. The chief features of this ingenious appliance are indicated in the figures on p. 140. The apparatus has a solid oak hinged top, with moulded edge, to prevent articles from slipping off. A mirror is also fitted on the underside. Placed below

¹ The "Axis" Mono-Wheel Stretcher Carrier with sunshade attachments is supplied by Axis Motors, Ltd., Crown Chambers, 9, Regent Street, London, S.W. 1. The firm will be pleased to send full details and to quote prices regarding these appliances.

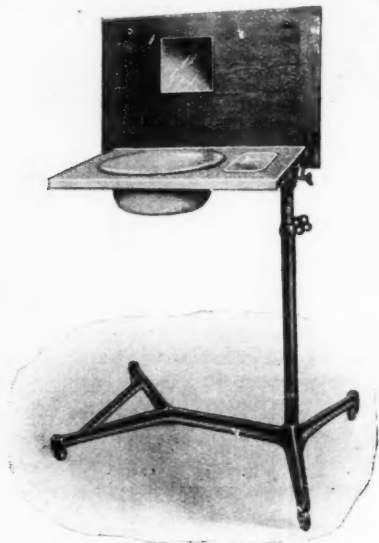
² The "Axis" Portable Bed-Table is supplied by Axis Motors, Ltd., Crown Chambers, 9, Regent Street, London, S.W. 1.



THE "AXIS" PATENT MONO-WHEEL CARRIER.

As illustrated, one man can do the work of two expeditiously and with but little fatigue for the patient. The "Carrier" accommodates any type of military stretcher now in use. The stretcher cannot fall out of the "Carrier," and in the event of the stretcher-bearer being wounded or falling, the patient being wheeled can only fall a few inches.

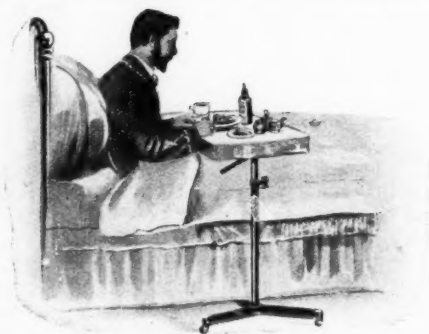
the oak top is a heavily coated, porcelain, enamelled iron cover, with fitted wash-basin and soap-dish of similar material. The framework is



THE "AXIS" PORTABLE BED-TABLE.

The illustration shows the top raised for the appliance to be used as a washing-stand.

of solid heavy iron, black enamelled, and the base is mounted on rubber castors for silent moving. The height of the table can be readily adjusted. All parts are detachable. The table can be used in connec-



THE "AXIS" PORTABLE BED-TABLE.

The illustration shows the appliance in use as a stand for bed meals.

tion with washing, shaving, and like personal matters, for the serving of meals, and for use as a writing, card, or work table.

THE THREE-TIER LETTER TRAY.

In the classification of case-papers, arrangement of charts, and grouping of correspondence, time, patience, and labour will be greatly conserved by the use of the THREE-TIER LETTER TRAY, which is illustrated in the annexed figure.¹ This simple, ingenious, but effective,



THE THREE-TIER LETTER TRAY.

contrivance is of oak, and well made. Each of the interchangeable trays has an inside measurement of $10 \times 15 \times 1\frac{1}{8}$ inches. The overall measurement of the set is 12 inches high, and $12\frac{1}{2} \times 17$ inches. This tray system provides a much greater capacity than the old-fashioned letter-basket, and can be placed on or near the desk, or wherever the worker desires. We have used this excellent tray set, and can commend it to the use of medical superintendents, hospital secretaries, and others desirous of facilitating their duties in these days of difficulty and overwork.

REQUISITES FOR TUBERCULOUS PATIENTS AND THEIR MEDICAL ADVISERS.

Trimethenal-allylic carbide compound, now being extensively used under the designation of "YADIL" ANTISEPTIC, has been submitted to numerous bacteriological and clinical investigations, and much evidence has been accumulated which seems to establish its position as a useful, non-toxic preparation in the treatment of tuberculous lesions.² A form of "YADIL" JELLY, and also a "YADIL" OINTMENT, have recently been introduced. The former seems likely to be of service in dealing with tuberculous and other infective conditions of the mucous membranes of the pharynx, larynx, trachea, and bronchi. The latter has been found effective in the management of lupus and other affections of the skin, and also in the alleviation of hæmorrhoids.

Brom-iso-valeryl-urea, recently introduced under the designation

¹ The Three-Tier Letter Tray is supplied by Smith's Systems, Ltd., 39, Thorp Street, Birmingham. Price 35s.

² Full particulars regarding "Yadil" preparations may be obtained from Messrs. Clement and Johnson, 19, Sicilian Avenue, London, W.C. 1.

of "DORMIGENE," promises to be a useful sedative and hypnotic in the management of certain tuberculous and tuberculously disposed subjects.¹

Messrs. W. C. Leonard and Co., of Saranac Lake, N.Y., have won a great reputation for their artistic and effective equipments for patients undergoing outdoor treatment, children in open-air schools, sportsmen and others living the open-air life. Under the title of "Adirondack Outfittings," they have issued an illustrated catalogue of what they term "Furnishings for the Outdoor Life."²

Under the designation of THE "VELVEY" INDIA-RUBBER SPONGE HEELS, there have been introduced contrivances which we think may be of service to nurses and patients in hospitals and sanatoria. Certainly, for patients undertaking exercise they should be of real assistance.³

Under the title of "Deliverance from the Horror of Consumption: A Health Trek through the Great Karoo," Mr. Fred A. Donnithorne, F.R.G.S., has issued an attractive, illustrated, and informing brochure regarding a tour for tuberculously disposed subjects which he is organizing.⁴

The American Commission for the Prevention of Tuberculosis in France is accomplishing a notable service by the issue of striking illustrated posters, some in effective colours, leaflets, booklets, and amusing instructive postcards.⁵ We would particularly direct attention to the artistic, humorous, and highly educative illustrated booklet "Aux Enfants de France." As models of admirable popular educational propaganda, these publications deserve the study of all leaders of anti-tuberculosis work.

The Local Government Board have recently issued a revised "List of Sanatoria and other Residential Institutions approved by the Local Government Board under the National Insurance Act, 1911, for the treatment of persons suffering from tuberculosis, and resident in England (excluding Monmouthshire), with the names of the administrative counties and county boroughs in which the institutions are situate, and the date on which the approval expires in each case."⁶

¹ Full particulars regarding "Dormigene" may be obtained from Messrs. Allen and Hanburys, Ltd., 37, Lombard Street, E.C., and 7, Vere Street, London, W.

² A copy of "Adirondack Outfittings" may be obtained on application to W. C. Leonard and Co., Saranac Lake, N.Y., U.S.A.

³ The "Velvey" India-Rubber: Sponge Heels are made in three forms, thin, thick, and extra thick, and suitable for either men or women. Full particulars may be obtained from H. A. Wanklyn, 17, Manchester Avenue, London, E.C.

⁴ Particulars of the proposed seven months' tour through the Great Karoo district of South Africa can be obtained on applying to Mr. Fred A. Donnithorne, Victoria Avenue, Southend-on-Sea, Essex.

⁵ Particulars regarding La Commission Américaine de Prévention contre la Tuberculose en France may be obtained on application to Headquarters, 12, Rue Boissy-d'Anglais, Paris, VIII., France.

⁶ A copy of the "List of Sanatoria and other Residential Institutions" can be obtained on application to H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2. Price 1d. net.

THE OUTLOOK.

THE TUBERCULOSIS PROBLEM AND THE TUBERCULOSIS MOVEMENT.

THE tuberculosis problem increases in complexity and magnitude. Under war conditions tuberculosis has become more prevalent and damaging. Both in this country and in the lands of our Allies tuberculosis is claiming a larger number of victims. If statistical returns are to be trusted, tuberculosis is also taking heavy toll from among our enemies. As the war proceeds the mortality from tuberculosis seems to increase. After the war tuberculosis will certainly long remain as one of the unconquered foes of mankind. War has not only led to an increase in the prevalence of tuberculosis, but it has resulted in a diminution in the activities of the tuberculosis movement. This is greatly to be deplored, for never before was there a greater need for the organization and administration of measures for the prevention and arrest of tuberculosis. Since the outbreak of war we have endeavoured to stimulate research and strengthen scientifically directed action by the publication of authoritative articles regarding various aspects of the tuberculosis problem under war conditions.¹ We have also repeatedly urged the importance of the establishment of a Commission or a Departmental or Inter-Departmental Committee, which should watch and study and collect evidence regarding all aspects of the tuberculosis question as it presents itself under war conditions, so that we may be in a position to reconstruct or to readjust methods and measures for making the tuberculosis movement more scientific and serviceable in its endeavours, not only under existing war conditions, but in the testing and difficult after-war days. Nearly four years of conflict have passed and no representative and authoritative body has been established for the investigation of tuberculosis as a war problem. Our American cousins and Allies have set us a fine example by the formation of their "Commission Américaine de Prévention Contre la Tuberculose en France," but we have not followed.² Once again we urge the importance of providing an approved and authoritative body to consider all aspects of the tuberculosis problem in the light of existing war conditions. Probably the most satisfactory and effective course would be to secure the appointment of an Inter-Allies Commission, somewhat on the lines of the Inter-Allies Commission on Alimentation. In any case, it is clear that steps should be taken at once, and preferably by the Local Govern-

¹ The Symposium on "War and the Future of the Tuberculosis Movement" appeared in the issue of this journal for January, 1916, Vol. X., No. 1. The Symposium on "The Tuberculosis Movement under War and After-War Conditions" appeared in the journal for January, 1917, Vol. XI., No. 1. The Symposium on "Tuberculosis among Combatants and War-Workers" appeared in the journal for April, 1917, Vol. XI., No. 2. The Symposium on "The Arrest of Tuberculosis under War and After-War Conditions" appeared in the journal for January, 1918, Vol. XII., No. 1. The Symposium on "Colonies for the Tuberculous" appeared in the journal for April, 1918, Vol. XII., No. 2. Other articles and notes which have appeared during the past four years have sought to arouse professional and public opinion to the pressing importance of the tuberculosis problem under existing conditions.

² The Headquarters of the "Commission Américaine de Prévention Contre la Tuberculose en France" is at 12, Rue Boissy-d'Anglais, Paris, viii.

ment Board, to secure the appointment of a thoroughly representative Committee capable of dealing with all aspects of the tuberculosis problem under war and after-war conditions. Such a committee should obtain the assistance of expert Commissioners, and every endeavour should be made to gain the co-operation of those having experience in methods of research, clinical investigation, organization, and administration, and every branch of medico-sociological study and service. The tuberculosis problem must be met and studied here and now if success is to attend the tuberculosis movement in the coming years. We shall be glad to receive expressions of opinion as to the ways and means by which the common desire may be best furthered.

NOTES AND RECORDS.

We have received a number of valuable reports, and regret that lack of space makes it impossible for them to be dealt with as they deserve. The Eleventh Annual Report of the King Edward VII. Sanatorium provides a valuable series of statistical tables giving "Ultimate Results" regarding cases which have been under treatment.¹ The Twenty-First Annual Report of the Loomis Sanatorium, of which Dr. Herbert Maxon King is Physician-in-Chief, is a particularly attractive and informing document, beautifully illustrated, and altogether a model production.² The Fourteenth Annual Report of the Boston Association for the Relief and Control of Tuberculosis contains a series of stimulating addresses and particulars regarding the development of the work of the Association.³ The American National Association for the Study and Prevention of Tuberculosis has wisely shortened and concentrated its name. In future, this most progressive of bodies dealing with tuberculosis will be known as the "National Tuberculosis Association."⁴ We have received communications from the Hon. Secretary of the Tuberculosis Dispensary Care Association, 1, London Street, Reading, and the Clerk of the Insurance Committee for the Borough of Reading, Broadway Buildings, Station Road, Reading, intimating that a handbook is in preparation dealing with the work of After-Care Committees in England, and inviting information likely to be of service in the production of such a work. A Course of Post-Graduate Study on Surgical Tuberculosis will be held at the Lord Mayor Treloar Cripples' Hospital and College at Alton, Hants, from Monday, July 29, to Saturday, August 3, inclusive. No fee will be charged, and lunch and tea will be provided. Full particulars may be obtained on application being made to Dr. H. J. Gauvain, the Medical Superintendent.

¹ Copies of the Eleventh Annual Report of King Edward VII. Sanatorium Midhurst, dealing with the period July, 1916, to July, 1917, can be obtained on application to the Medical Superintendent. Price 1s. post free.

² The Twenty-First Annual Report of the Loomis Sanatorium for the Treatment of Tuberculosis, at Liberty, Sullivan County, New York, is published at the Sanatorium, and copies may be obtained on application.

³ The Fourteenth Annual Report of the Boston Association for the Relief and Control of Tuberculosis is published at the Central Offices, 3, Joy Street, Boston, Mass., U.S.A.

⁴ The Headquarters of the American National Association for the Study and Prevention of Tuberculosis have for some time been situated at the United Charities Building, 105, East 22nd Street, New York. In future the Headquarters of the American National Tuberculosis Association will be at 38, Fourth Avenue, New York City, U.S.A.